Targeting the Full Value of Digital Disruption

The next wave of digital technologies will impact every component of a company's business operations

IBM iX and University of Cambridge

Prologue

The first significant wave of digital disruption included e-commerce and was centered on internet-enabled platforms that facilitated transaction, interaction and exchange of value between participants. Advancements in mobile, cloud and analytics resulted in the rapid expansion of these platforms and more personalization of offers. The platform companies that emerged from this shift captured significant value by monetizing direct access to the customer and leveraging the benefits of network externalities, often by acting as intermediaries within ecosystems.

The maturity of cloud, analytics and mobile is now matched with the progress in IoT, AI and blockchain. Collectively, these newly emerged technologies are changing the economics of industry value chains from end to end and are impacting every component of business models - the value proposition, value creation, value capture and value network. (See Exhibit 1) The convergence of these technologies is driving further expansion of ecosystems and the blurring of industry borders, enabling new value propositions and value creation opportunities across industries while creating new sectors. Together, these new digital technologies are creating intelligent engines that enable augmented human intelligence, autonomous decision making, more efficient machine-to-human interactions, and optimization of any system in real time. The potential economic impact from this second chapter of digital disruption is significant but often hard to quantify.

In search of value, firms across industries have been growing their investment in digital technologies (See Exhibit 2) but are challenged in targeting and capturing the full value potential. Most digital initiatives based on these newer technologies have focused on incremental product improvements and operational efficiencies. This is likely because firms can see the results of such initiatives faster and can use well-established cost take-out KPIs to set targets and measure success. The impact from these cost savings and productivity gains will be significant.

In the US, we estimate that this will amount to an average of USD 1.8 trillion per year over the next 10 years. However, efficiency gains represent only a portion of the value potential and will not be evenly distributed across sectors. The real disruptive value of digital is in the rise of value propositions and associated business models which could contribute to significant growth and innovation. Companies that have been focusing their digital investments in both operational efficiency initiatives, as well as growth and innovation through platform-based business models have generated close to USD 3 trillion of value in the past decade. (See Exhibit 3)

Exhibit 1: Business Model Components: 4Vs

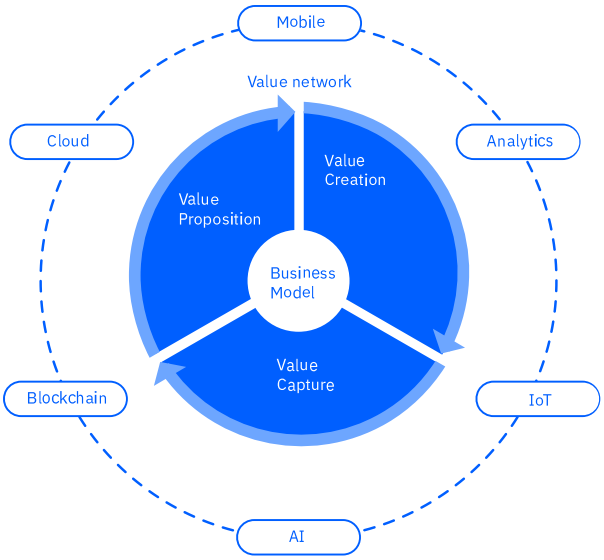
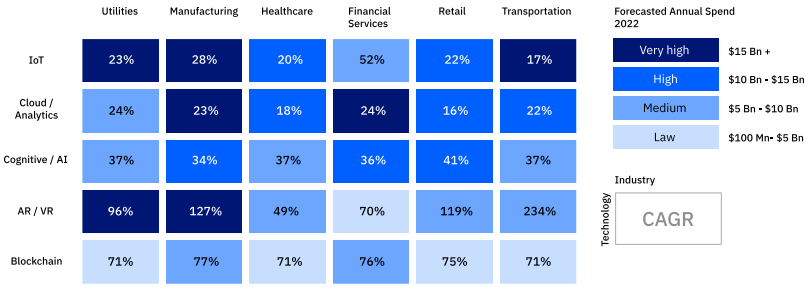


Exhibit 2: Enterprise spend in digital technologies



* Source: Velu, C; Coopetition and Business Models, Routledge (2018)

Our belief is that the second chapter of digital will disrupt a far broader set of business models than we have seen before. The next wave of digital technologies will impact every component of a company's business operations by eliminating costs, improving decision making and reinventing the economics of many industries. The combination of IoT, AI and blockchain, in particular, could enable strong network effects, whereby an established leader can drive a virtual circle of adoption resulting in improved capabilities and economics. As such, it is imperative for organizations to assess value creation and capture opportunities through new value and expanded value networks. They must develop innovative value propositions to quantify a value target for their business and to form their ambition for digital.

From our research on digital business model innovation and our experience managing digital transformation efforts for enterprises across the globe, we have practical recommendations to increase the likelihood that your digital transformation efforts are successful. (See Exhibit 4)

The steps to targeting full value potential include:

1. Confirming your organizational ambition by mapping and reimagining your ecosystem and your value chain

2. Identifying opportunities and defining initiatives across every component of the business model and making deliberate choices in prioritizing them into a value roadmap

3. Conducting a digital capability assessment to develop a capability roadmap in support of the value roadmap

4. Aligning and engaging the organization behind the ambition and the value roadmap; shaping a program with strong governance

Exhibit 3: Market Cap Growth of Platform Companies

Market Capitalization 2008-2018 ($ bn)		
Company	2008	2018
Apple	$72	$890
Google	$100	$768
Microsoft	$333	$680
Amazon	$24	$592
*Facebook	$71	$545
Total	$600	$3,475
*Listed in 2012		

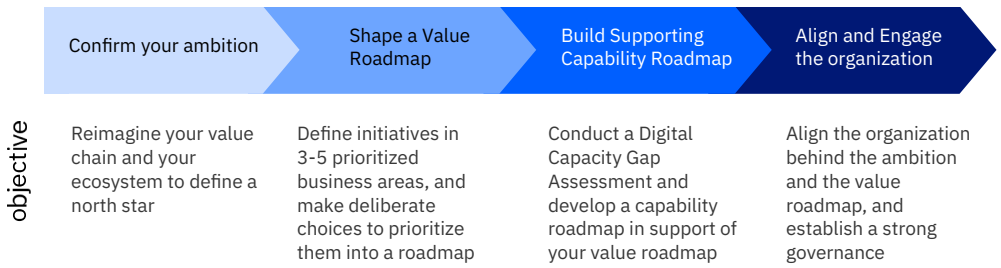


Exhibit 4: Four Courses of Action to Target Maximize Value

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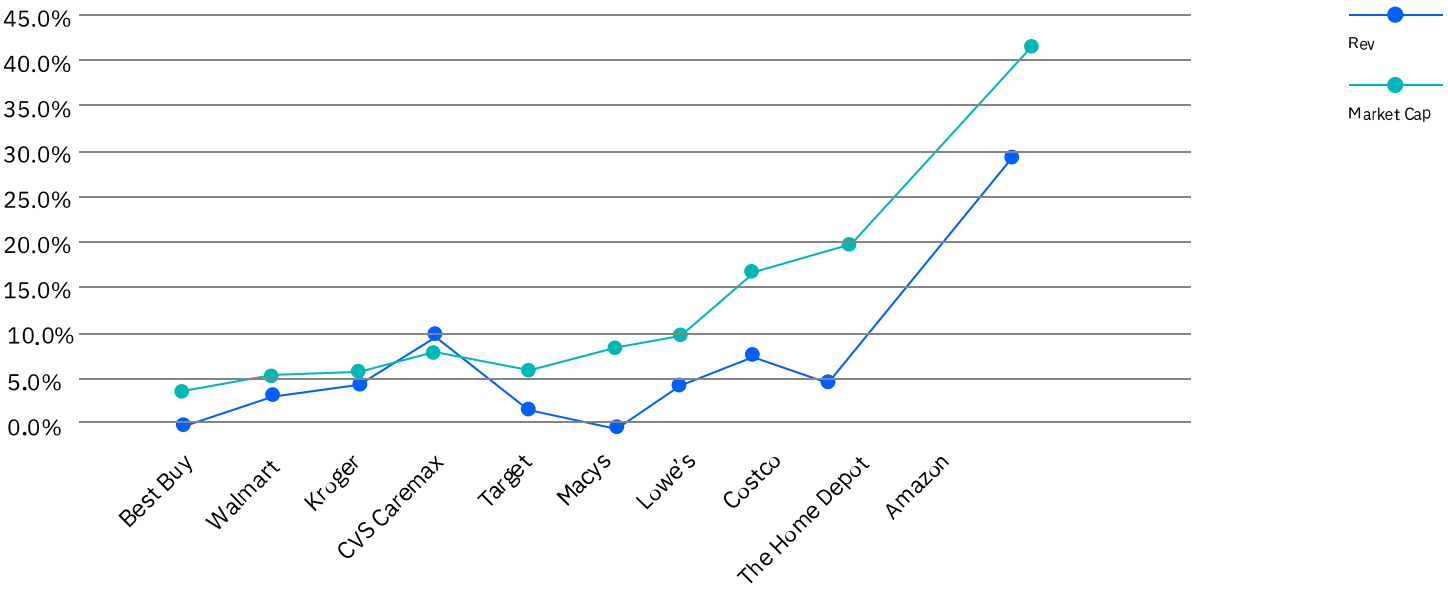
Section 1: The unprecedented value opportunity

Early applications of digital technologies stressed digitizing enterprise data so that it could be electronically manipulated and easily connected to drive productivity.

The first real wave of disruption, however, was centered around platforms like e-commerce that facilitated transaction, interaction and exchange of value between participants. E-commerce websites increased consumer power, shifted value closer to the consumer and changed consumer experience. Sophisticated analytics augmented the transactional data from the e-commerce websites and made recommendations for more personalized offers and experiences. With advancements in cloud, analytics and mobile, these platforms expanded rapidly, enabling new and disruptive business models and human experiences. Cloud allowed quick and low-cost deployment of e-commerce and other software platforms globally and accelerated advancement in analytics. Transformation of these platforms resulted in innovative, mobile-enabled customer experiences, more engagement and further personalization. Platform-based companies and companies that adopted these technologies created significant value for all their stakeholders: shareholders, employees and customers. The retail sector provides a clear example of how digital disruptors created significant value through business model innovation. In the past decade, the top 10 retailers in the US grew revenues at a compound annual growth rate (CAGR) of 5.4 percent, while their market capitalization grew at a CAGR of 15.9 percent to USD 1.56 trillion. Sixty-three percent of this market cap value was captured by Amazon alone. (See Exhibit 5)

Top 10 US Retailers:
Total Market Cap in 2018= $1,569 bn, CAGR of 15,9%
Total Revenue in 2018 : $1,523 bn, CAGR of 5.4%



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The next wave of disruption involves more widespread use of digital technologies across entire value chains and across more sectors, and further expansion of platforms and ecosystems. Together, IoT and AI are enabling significant optimization opportunities across the value chain: in supply chain, operations and distribution. (See Exhibit 6) Digital technologies are also causing dislocation and disintermediation of players in the value chain. IoT can create a digital view of any physical system, enabling real-time monitoring and management of physical systems. Cloud allows for aggregation and analysis of this data at scale and cost effectively. The application of AI to the vast amount of data that IoT-enabled physical objects create can drive improvements in autonomous decision-making, automation and optimization. Blockchain, IoT, cognitive and AI enable expansion of ecosystems and business platforms among competitors and beyond industry boundaries, further shifting value across the network of stakeholders.

Exhibit 6: Digital Adoption Trends in Supply Chain, Operations & Distribution

Supply chain

Supplier Integration

Elimination of manual process, improved transparancy, reduced risk of fraud

- Supplier Integration for ordering and payments
- Automated procurement platforms for sourcing
- Blockchain sourcing traceable to origin

Demand Forecasting

Accurate demand planning, reduced inventories, reduced stock outs

- Predictive demand planning
- Personalized inventories
- Real-time visibility of supply and demand

Automation of Labor

Elimination of manual tasks, reduced errors, improved safety, improved productivity

- Optimized ordering and inventory managament
- Autonomous material transportation
- Robotics in handling materials in transit

Material Tracking

increased visibility throughout supply chain, improved decision making, reduced risk of theft or fraud

- Real-time tracking of inbound material
- Real-time inventory management
- Real-time product usage tracking at customer

Source: IBM research & analytics

Exhibit 6: Digital Adoption Trends in Supply Chain, Operations & Distribution

Operation

Automation of Labor

Improved quality of service, reduced errors, increased productivity and capacity

- Robotic automation of manual labor
- Transition of customer service tasks to AI
- Intelligent workforces management

Labor Empowerment

Increased productivity, improved work quality, reduced errors, improved decision making

- Mobile apps for info sharing
- Advanced analytics in product design
- Human augmentation with robotics and AR

Facilities Management

Reduced energy usage, increased utilization of equipment, reduced maintenance costs

- Connected buildings
- Predictive maintenance and real-time monitoring
- 3D printing of space parts on demand

Centralized Systems

Increased transparancy, improved decision making, improved security, reduced human errors

- Cloud-based administrative systems
- Real-time pricing and inventory management
- Centralized record keeping

Distribution

Streamlined Experiences

Elimination of non-value-adding processes, staff reduction, improved customer service

- Connecting customers more directly to service
- Self-service tools and apps
- Robotic and AI assistants to guide customers

Personalized Service

Staff reduction, improved customer service, improved marketing effectiveness

- Identification and tracking of customers
- Real-time machine learning of preferences
- Cognitive salesforce to provide service

Automation of Labor

Staff reduction, increased productivity, improved customer experience

- Cognitive customer service representatives
- Mobile tools and apps to empower salesforce
- Use of robotics to deliver goods and services

Reimagined Delivery

Reduction of asset-intensive delivery methods, improved customer service

- Mobile and online channels for service
- VR experiences to connect with customers
- Extension of service and customer interaction into homes

Source: IBM research and analytics

Exhibit 7: Coopetition Examples

Industry Example	Value Proposition	Value Creation	Value Capture	Value Network
Electronic trading and bond markets - revolutionary business model innovation	Enable direct trading between investors in order to reduce costs and improve timeliness of trades	Banks provide credit guarantee for the trades	Banks charge a fee for acting as credit guarantor	Dominant banks cooperating in order to change the structure of the market in a revolutionary manner
Electronic book retailing - Amazon Marketplace	Enable customers to buy either new or used books from Amazon or its competitors by comparing them on a single page	Consolidating Amazon and third-party books on a single store page and providing comparisons of ratings, shipping costs, and returns policy	Amazon earns the margin on its own inventory and charges a commission on the sale of third-party products	Cooperate with competitors by enabling them to list books on the Amazon Marketplace website
Film and Television Distribution - Netflix	Enable customers to view Netflix, or competitor produced media content, on demand, for various platforms (tv, computers, tablets, etc.)	Banks provide credit guarantee for the trades	Netflix earns a margin on licensed content through low distribution costs for an immense number of repeat subscribers	Cooperate with competitors to develop new content, which increases engagement for current subscribers and attracts prospects

Exhibit 7: Coopetition Examples

Section 2: Challenges in estimating and measuring the value

Estimating and measuring the impact, and as a result maximizing value, from digital technology investments remains a challenge for most enterprises.

For businesses, improved profitability and productivity are often used to measure the impact of digital initiatives. Digital technologies can increase profitability by reducing a wide range of costs across the value chain. These technologies are streamlining supply chain activities through integration, automation, tracking and better forecasting. They are also driving significant operational efficiencies through improved equipment utilization, increased labor productivity and enhanced monitoring and management. In distribution, they help remove steps and activities between customers and how they use goods and services.

In spite of the prevalence of digital technologies, in aggregate there seems to be a persistent slowdown in productivity that has plagued modern economies for the past 10 years. This is widely known as the productivity paradox. There are many possible reasons that explain it, including the impact of the financial crisis, the lack of diffusion of the benefits of digital technologies among small and medium sized enterprises and mismeasurement of the digital economy. However, we posit that siloed approaches and too much focus on operational efficiencies and the lack of business model innovation following the adoption of digital technologies might be a major contributor to the productivity paradox.

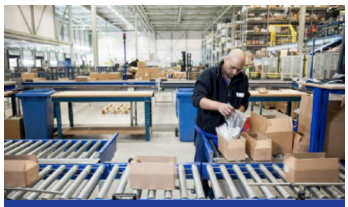
The impact of cost optimization-focused initiatives can be measured more easily with traditional KPIs such as headcount reduction, energy costs, defect rate and more. On the revenue side, incremental revenue is mostly driven through a shift to more services and productivity of the sales channels. But estimating revenue impact, specifically new revenue streams, is more difficult. While digital channels may provide new mechanisms for serving customers, distinguishing between new revenues and shifts across channels, or shifts between market competitors, especially between incumbents and new entrants, is more challenging.

Estimating the value of new ecosystem propositions is even more challenging. In estimating value from extended ecosystems and new business models, such as data monetization schemes, it is often unclear who actually captures the value. It is also usually hard to estimate how much value will be created, how much value each participant contributes and how their contributions to the value pie change over time. Companies that invested

in digital for operational efficiency but left money on the table by not thinking about innovating their offers were disrupted. New players such as Apple and Google entered the automotive industry with self-driving cars. This was disruptive to incumbents who put their focus on significant operational efficiencies in their manufacturing and supply chain, causing them to play the hard catch up game. On the other hand, companies that started with the operational efficiency to create momentum and funds for their longer-term innovation-focused initiatives disrupted the market. Adidas has been on the cusp of utilizing mobile and cloud to help distribute and market its products for a decade. However, recently the company has reinvented its supply chain by leveraging additive manufacturing, or 3D printing, to develop its new Futurecraft 4D products. These were developed in Adidas's new SpeedFactory to be sold out when it was showcased at popup stores in New Your City in January 2018.

Despite the challenges in estimating and effectively measuring value of new propositions and associated ecosystems, leaders are not just investing in one-off operational efficiency initiatives. Leaders are adopting a holistic lens to the possibilities, assessing new value propositions and ways of delivering value to their end markets. (See Exhibit 8)

Operational Efficiencies



Warehouse Robots Amazon Robotics

Use a fleet of inventory scanning, sorting, shifting, and packaging robots to reduce labor costs associated with daily warehouse operations

New Products and Services

Home Automation Data Amazon Echo, Ring

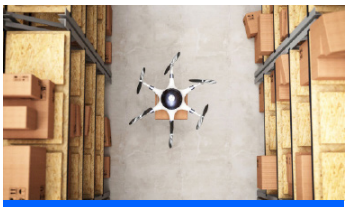
Alexa is learning about consumer, and further personalizes interactions and offers. Homes have been penetrated by smart speakers, cameras, alarm clocks, mirrors and help extract the consumer data Amazon sells to others

Ecosystem Economy

Smart Fridge Restock Amazon Dash Replenishment

Based on consumption habits and inventory, Amazon restocks fridges by delivering items at the moment of delpetion

Autonomous Economy



Autonomous Delivery Amazon Prime Air

Amazon will attempt to provide a fully autonomous retail experience. Based on various sensor data items are purchased and delivered without any human involvement

Section 3:Impact on sectors and value chains

To estimate the potential impacts of five core digital technologies that include mobile, cloud and analytics, IoT, cognitive and AI, and blockchain, we developed a value chain-based model.

Value chains vary by sector and even by company, but most commercial value chains have similar structures. We estimate an average of USD 1.8 trillion annual value chain cost reduction opportunities from the five emerging technologies over the next 10 years and just in the US. (See Exhibit 9) (See Appendix A for methodology)

USD 1.8 Trillion
Projected average annual cost savings for economy based on 10 year model*

10%
Potential total reduction over 10 years

We estimated total impacts by cataloging how each technology could transform individual parts of each sector's value chain. (See Appendix B for Sector Value Chain Taxonomies) We assessed current and planned uses of emerging technologies for leading firms in each sector. We then mapped where in the value chain these technologies were being applied and how they would create value. Finally, we documented any publicly disclosed estimates of the potential value or already-delivered value. The full encyclopedia of unique use cases documents over 200 distinct applications. (See Exhibit 10 for examples)

Audi
Modular Assembly with Robotics

Target 20% Productivity Improvement

- IoT in the form of connected modular workstations transforms auto production lines
- Autonomous robots bring parts and equipment to workers on demand
- Workers are outfitted with barcode scanning gloves and AR headsets to guide the assembly

Kroger
Analytical Customer Monitoring

USD 250 Million in Labor Savings. Target roll-out to 2400 stores

- Infrared cameras monitor checkout lanes and identify number of customers waiting in real time
- Historical data is then combined with the real-time queues to alert supervisors
- Optimal allocation of workers throughout the store in real time

Kiwi Rail
Predictive Maintenance for Rail

6% Operational Efficiency amounting to € 20M per year

- Capture detailed information shared in near real-time and allowed supervisors to conduct predictive maintenance work
- Productivity of maintenance crews doubled and led to 83% faster generation of compliance reports

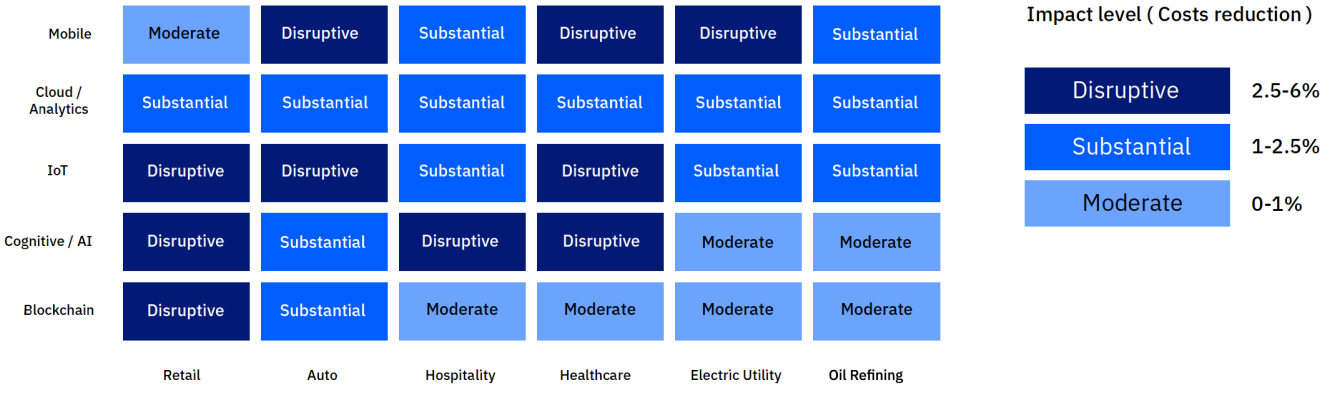
Oncor
Reduce Outages through Cognitive AI

Reduced outages, improved service

- AI applied to complex geospatial and time-based datasets collected by satellites, flights, IoT sensors and weather models
- AI applied to prioritize high-risk areas, and adapt maintenance ops to improve safety and reliability

While emerging technologies will impact all sectors, the value they create will not be evenly distributed. The amount of impact depends on a variety of factors including, but not limited to, which parts of the value chain are affected, which technologies dominate and how fast industries drive successful adoption of digital technologies. We have done a 'bottom-up' estimate on several sectors in order to see how different the impact could actually be. (see Exhibit 11)

Exhibit 11. Estimated Technology Impact Potential by Industry Sector



We focused our attention on the five technology areas for estimating the impact of digital technologies going forward. (See Exhibit 12) Our analysis is showing the lower bound of the value because there are significant opportunities for digital technologies to create value from new business models that are not considered in our impact analysis.

Exhibit 12: Selected Technology Groups

Blockchain - Hyper-ledger payments; Advanced record keeping system

Cognitive and AI - Machine Learning Apps Automated Decision- Making Systems; Image and Pattern Recognition Software

Internet of Things - Internet-connected Devices; Sensor-based Tracking: Smart Equipment & Devices

Cloud and Analytics - Cloud-based infrastructure; Statistical Analysis

Mobile - Mobile phone applications; Tracking and beacon technology; AR/VR

Section 4: Recommended courses of action

Our value chain-based macro model predicts which sectors will realize the most value from digital and which technologies will drive the most impact. For an individual enterprise, understanding how the industry value chain might get disrupted, identifying value opportunities from a technology or group of technologies, developing a value case, developing a clear vision and actionable plan, developing the capabilities to execute and engaging the organization to execute all create hurdles to success.

To maximize value, the CEO and leadership team must prepare the organization for a journey, and must answer three key questions to maximize business value from new digital technologies: How to begin, where to go and how to get there?

- Confirm your organizational ambition and define a “north star” by mapping and reimagining your ecosystem and value chain.
- Identify opportunities and define initiatives across every component of the business model and make deliberate choices in prioritizing them into a value roadmap.
- Conduct a digital capability assessment to develop a capability roadmap in support of the value roadmap.
- Align and engage the organization behind the north star and the value roadmap; shape a program with strong governance.

1. Confirm ambition

Start by mapping and scanning your value chain and ecosystem and developing a comprehensive and fact-based understanding of how your customers are changing. Use design thinking to re-imagine how ecosystems might be expanded, what work steps can be removed across your value chain, how workflows can be accelerated and in what new ways customers can be successful. (See Exhibit 13) Based on what you uncover, you will be able to devise appropriate strategic approaches. You will assess if you should look at new value propositions and new value networks or whether you should focus on delivering the current value proposition more effectively and efficiently.

- Map your ecosystem, assess expansion opportunities. Extend your view to movements in adjacent markets and coopetition opportunities
- Map your value chain and re-imagine how technology can be applied to remove steps, accelerate workflows, drive effectiveness
- Use data to develop a comprehensive understanding of how your customers are changing
- Look outside your industry, assess risks of players crossing industry lines and how value is created in similar industries
- Use Design Thinking to re-imagine your value proposition, your ecosystem and your value chain

Confirm Ambition

Decide whatever emerging technologies will be used to drive optimization or if they should span to include new value proposition and new ecosystems.

2. Shape a value roadmap

Based on your top-down assessment of where digital technologies could provide benefits across your value chain, you have a sense of how you can shape and extend your ecosystem(s). Since you know what your customers need or want, you can prioritize three to five business areas to make your efforts more focused and targeted. (See Exhibit 14) Conduct a bottoms-up assessment to confirm opportunities and define initiatives. For each initiative, estimate the value, cost, time to value, dependencies and other factors.

Using a set of deliberately chosen criteria, prioritize and sequence these initiatives into a value roadmap. Consider three guiding principles in prioritization:

- Adopt a balanced mix of initiatives between operational optimization and new value propositions to deliver the best customer experience, even if your ambition is to develop new value propositions.
- Prioritize opportunities with short time-to-value to build momentum. Lack of speed and momentum kills transformation.
- Prioritize initiatives like inventory optimization to drive capital efficiency and release cash quickly to make your program self-funding. Self-funding programs don't get stalled.

- Prioritize 3-5 business areas based on your top-down assessment of the value chain, ecosystem, industry and customer needs & wants
- Conduct a bottoms-up assessment in these business areas to confirm opportunities, define initiatives, create use case inventory
- • Develop a value case for the initiatives, and make deliberate choices in prioritizing and sequencing them into a value roadmap
- Consider 3 key guiding principles:
- Adopt a balanced view between short & long term, and operational efficiencies and new value propositions
- Prioritize initiatives with short time-to-value to build momentum
- Prioritize initiatives that drive capital efficiencies, and can release cash quickly to make program to self-funding

Share a value roadmap

A prioritized, sequenced, and detailed set of digital initiatives with their value case tied back to business value level becomes your strategic value roadmap.

3. Build the supporting capability roadmap

Successfully bringing new digital technologies into your value chain will require a set of foundational capabilities. These capabilities include, but are not limited to:

- Extensive data capabilities focused on expanding ecosystem and orchestrating connections, across your industry and beyond
- An insights-driven engine to apply intelligence to the data for better decision making, automation and insight-driven product innovation
- An innovation engine that enables fast execution and consists of interdisciplinary teams and fluid work structures to enable collaboration
- Ecosystem partnership frameworks and value share models to allow expansion and monetization of ecosystem partnerships
- A culture of agile innovation
- Value orchestration to monitor and manage value realization, ensuring the value roadmap does not stay static

Conduct an assessment of the foundational capabilities to develop a roadmap and prioritize capability development in line with your value roadmap. In provisioning the digital capabilities, consider third parties in providing and enabling complementary assets.

4. Align and engage the organization

Digital transformation requires empowering and engaging the whole organization. The strategic value roadmap is a key resource for executing your transformation. This should be a central part of your communications and change management efforts that need to accompany digital transformation. Staff can quickly become focused on the one digital effort that involves them directly, but the roadmap enables them to see how their efforts contribute to larger goals. You should establish a strong governance committee from the beginning to engage leadership in shaping and approving the strategic value roadmap, helping to drive awareness and empowerment. You will need confirmation on the organizational ambition and value roadmap from the governance committee, with continued focus on communication and driving awareness. roadmap, helping to drive awareness and empowerment. You will need confirmation on the organizational ambition and value roadmap from the governance committee, with continued focus on communication and driving awareness.

Appendix A: Approach in assessing value chain cost reduction impact of five emerging technologies

1. Identify sectors of the US economy across the digital maturity spectrum with minimal overlap of business operations. For example, Auto is a subset of the larger Manufacturing sector but Auto and Oil Refining have minimal overlap.

2. Identify the market size for each sector. Use US revenue or net sales (excluding pass through sales) of a representative sample of companies operating in the sector to assess the total size by revenue of the sector. Ensure that the companies in the representative sample bucket do not have operations across multiple sectors of the US economy. For example, Amazon is a retailer but also a software company through its Amazon Web Service product offering.

3. Estimate the market size over next 10 years. Historical performance of the sector adjusted for recent macroeconomic events coupled with demographic changes and impact due to innovation in complementary sectors is used to estimate market size. For example, impact on oil consumption over 10 years differs under scenarios of moderate to rapid progress in electrification of personal transport.

4. Evaluate the cost structure of the sector and prepare an income statement of the sector. From the income statement, you can derive insights on true cost structure and margin, both gross and operational. Assess impact of discount pricing as part of marketing expense to improve reported revenue numbers and update the cost structure evaluation.

5. Derive true cost structure of the industry by evaluating major cost components, both direct and in-direct costs such as cost of goods and overhead costs vs accounting costs such as research and development. Estimate the true cost and margin for the sector.

6. Develop value assessment model and assess value from cost reduction for each digital technology for a given sector. The model takes as input the maturity of the digital technology across the true cost structure components of the sector, like the adoption of IoT across supply chain and distribution components of the cost structure. The cost saving potential of the digital technology for each sector across all the components of the true cost structure is then assessed over 10 years based on comparative analysis and on benchmarking analysis of the sector verses the wider US economy. Comparative analysis uses a reference from another sector where a given digital technology has delivered benefit. The benefit is then adjusted by applying sector knowledge and insights. Benchmarking provides a comprehensive way to map a sector's position in terms of digital adoption and cost efficiency maturity in relation to other sectors. This helps to set upper bounds on the cost reduction possible within a given sector using digital technologies.

7. Key considerations used in developing the value assessment model

8. a. Cost reduction for one sector is revenue impact for another sector. Estimate of cost reduction must factor in lower revenue and hence lower direct and indirect costs for the sector due to cost reduction in upstream sector. For example, cost reduction in retail will impact revenue estimate of manufacturing or logistics sector. A model that captures cross-sector economic forces and incentives is key to assessing realistic cost reduction potential.

9. b. Maturity of digital technology within a sector will determine time-to-value of cost reduction. Each sector may require specific solutions within a digital technology family. For example, current mobile technology might be enough for the banking industry to reduce costs for the next 10 years at a steady rate but AI and IoT will need to be integrated and must operate seamlessly to reduce exploration cost of oil refining sector over next 10 years, which may delay a cost-reduction opportunity. A maturity assessment framework for digital technologies and future roadmap of research and development per technology is important to assess the maturity path of technology.

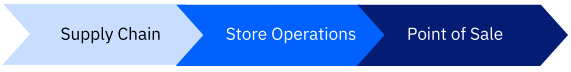
10. c. Not all innovation will reduce cost. Industries that were traditionally far removed from operational innovation could see negative value in the short term. A mismatch between speed of digital technology rollout and readiness of sector could misalign and cause negative benefits in the short term. External forces such as globalization, regulation and public policy could limit pace of innovation in certain sectors of the economy. Having a framework to assess medium term global headwinds helps to scale future cost reduction estimations.

11. Scale the cost reduction estimates to cover for the US economy. Estimate the scaling factor based on the total gross domestic product of the US net of exports and by comparing it to the total US revenue of the sectors.

Appendix B: Value chain taxonomies by sector

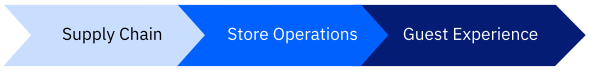
Retail

- Focused on wholesalers and grocers
- Excluding e-commerce
- Industry-specific value chain:



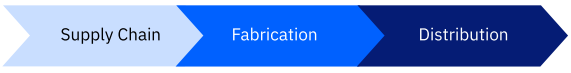
Hospitality

- Focused on hotel and restaurant chains
- Industry- specific value chain
- Industry-specific value chain:



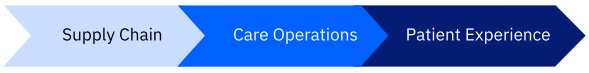
Automotive

- Manufacturers and sellers of vehicles
- Excludingride-sharing
- Industry-specific value chain:



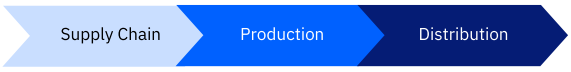
Healthcare

- Focused on delivery of healthcare (hospitals)
- Industry-specific value chain



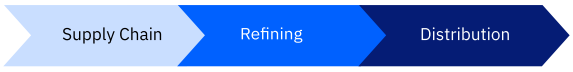
Electric Utilities

- Regulated producers of electricity
- Industry-specific value chain:



Oil Refining

- Focused on refining and delivery of liquid fuel
- Industry-specific value chain:



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